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Optimization of a fructooligosaccharides purification method using activated charcoal

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Abstract

Fructooligosaccharides (FOS) have gained large commercial interest due to its beneficial properties in the human health as prebiotics. FOS are produced industrially by fermentative processes. However, the result of such fermentations is a complex mixture containing salts and approximately 50% (w/w) of low molecular weight sugars that have to be eliminated. Among other techniques that have been studied, the adsorption onto activated carbon is still the most suitable one since activated carbon is cheap, has a large surface area and pore volume conducting to a good sorption capacity. Furthermore, this sorbent can be regenerated during desorption with ethanol. Based on the above discussion, in this work the adsorption and desorption characteristics of FOS on activated carbon, using a gradient of ethanol, were optimized. Initially, the activated carbon was loaded with fermentative broth. To remove the non adsorbed sugars, a washing step with pure water was included. Afterwards, the retained sugars were recovered by elution with a gradient of ethanol increased sequentially with specific volumes from 1 to 50% (v/v). Fractions collected at different time points were evaporated and subsequently freeze-dried. This process was found to be very efficient in the demineralization of broth, and it was possible to recover 80% of the initial FOS loaded on the column with 89% of purity. Some of the fractions were found to contain 97% of pure FOS in total sugars. In summary, purification of FOS using an activated charcoal column is a very efficient process yielding high levels of purity from a fermentative broth.